specialized 'general surgeon' is going to find his niche five, ten or fifteen years hence, when he may be either in isolation or a member of a well-staffed hospital.

If he finds himself in isolation he must be equipped to cope with every sort of emergency: acute appendicitis, bleeding ulcers, intestinal obstruction, ruptured spleens and livers, acute retention, head injuries, broken limbs, vascular injuries and stove-in chests. In particular the number and variety of abdominal emergencies will require him to be at home in the peritoneal cavity. He should also, for example, have that facility in tracheal intubation and in the whole range of 'suck and drip' techniques that comes only from long practice.

To achieve these abilities will require long and hard training. Thus equipped, the general surgeon, wherever he may find himself, will have little difficulty in discovering the sort of 'cold' surgery that needs to be done and that he can tackle with confidence. If he finds himself on the staff of a well-balanced hospital he would clearly be the man to take charge of the accident and emergency service. This would be his first duty and he should be given a number of beds primarily related to this duty. The breadth of his knowledge would make him a valuable member of the teaching staff and he would in particular have the task of training the next generation of surgeons in the same specialty. He would be invaluable in intensive surgical care and could have a broadly ranging advisory capacity in relation to problems arising in the care of patients in the charge of highly specialized units. He would be ideally trained to carry out original and exploratory surgical work and might very well have a particular attachment to a surgical firm in whose work he felt a special interest.

It is not too much to think that amongst a group of such men the ideal surgeon of the future for the head of a professorial department will be found. As the retired head of a surgical department and as one of the last of the truly general surgeons, I can think of no more fitting end to this outline of my views on 'tomorrow's surgeon'.

Meeting January 6 1971

Short Papers

Coronary Artery Surgery

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Our present attitude to the problem of myocardial ischæmia due to coronary atherosclerosis is to regard the heart in the same way as any part of the body affected by vascular occlusive disease. Consequently our surgical approach to this condition is undertaken on the same basis as in peripheral vascular disease.

With the advent of coronary arteriography (Sones & Shirey 1962, Sones *et al.* 1959) an accurate anatomical diagnosis has become available, making it possible to apply well-established vascular surgical techniques to the coronary arteries.

Our initial experience with this type of surgery is reported here. Detailed post-operative hæmodynamic assessments will be presented in a later paper.

Clinical Material

Between October 30 1967 and November 30 1970, 31 patients underwent direct coronary arterial surgery at Guy's Hospital and the National Heart Hospital, London. Coronary endarterectomy was performed in the first 8 patients and an aorta-to-coronary saphenous vein bypass in the other 23. This presentation is confined to the latter group as we now consider the saphenous vein bypass between the aorta and coronary arteries the best procedure for direct coronary revascularization.

Among these 23 patients were 21 males and 2 females, whose ages ranged from 24 to 61 years, with an average age of 51·7 years. All patients were severely symptomatic and disabled before surgery. The duration of symptoms varied between 6 months and 15 years. A previous history of myocardial infarction was given by 10, 3 of whom had had multiple infarctions.

The pre-operative electrocardiogram was reported as normal in 12 patients, and with evidence of previous myocardial infarction in 11.

Coronary arteriography was performed in all patients; 75% obstruction of one or more major

vessels was present in 17 and 90% obstruction in the other 6. In addition, 3 patients had a left ventricular aneurysm and 3 others had well-defined areas of akinesia of the left ventricle.

Surgical Technique

A mid-line sternotomy provides the best exposure of the heart and coronary vessels. While the chest is being opened, one or both long saphenous veins are excised through multiple small incisions (Favaloro 1968, Johnson *et al.* 1969).

After heparinization the ascending aorta and both venæ cavæ are cannulated. The heart is carefully inspected to detect areas of akinesia. All three main coronary vessels are palpated. A segment is then selected for anastomosis in the affected vessel or vessels.

High-flow normothermic cardiopulmonary bypass is then established using hæmodilution and a bubble oxygenator, and a vent is placed in the left ventricle to decompress the heart. Exposure of the right coronary artery is excellent and displacement of the heart is not necessary unless the anastomosis is being performed on the posterior aspect. To approach the anterior descending and circumflex coronary arteries it is usually necessary to displace the heart towards the right. This is easily accomplished by placing two large swabs posteriorly in the pericardial cavity.

Two 2/0 silk sutures are placed around the vessel, one proximal and the other distal to the selected area for the arteriotomy. Gentle traction of these sutures is sufficient to control bleeding after the vessel has been incised. Two interrupted sutures of 6/0 Mersilene are then placed through the adventitia of the vessel at the level where the incision is to be made. By gentle traction of these sutures the artery is better exposed.

The initial incision is made with a No. 15 knife blade and enlarged with Potts scissors; the length varies between 0·8 and 1 cm.

The adventitia is dissected away from the saphenous vein and both ends of the vein are prepared for anastomosis. They are transected at a 45-degree angle and the opening is enlarged by a longitudinal incision. The vein is always placed in a reversed position to allow an interrupted blood flow. The distal anastomosis between the coronary vessel and the vein is done first. When the artery is small or irregular due to multiple atherosclerotic plaques a small metal probe is inserted distally into the lumen of the vessel and the anastomosis is performed with multiple interrupted stitches of 6/0 Mersilene. In cases where the arterial lumen is larger the anastomosis can be performed with a running stitch of the same material. To facilitate the surgical manœuvres anoxic arrest is employed for up to 15 minutes; if a longer time is required, it is preferable to induce ventricular fibrillation and perfuse the myocardium.

The aortic area for the proximal anastomosis is selected after placing the vein in a 'comfortable' position to avoid kinks or acute angulation of the graft. A vascular clamp is placed on the ascending aorta to exclude part of the vessel, a small piece of the aortic wall is excised and the proximal anastomosis is then performed with a continuous suture of 6/0 silk. When present, left ventricular aneurysms are usually well delineated and excision is easily performed. The ventricular incision is then closed in two layers reinforcing the suture line with two strips of Teflon felt. The air is evacuated from the left ventricular cavity and bypass is gradually discontinued allowing the heart to take over the load of the circulation. Atrial and ventricular pacing wires are implanted. The pericardium is loosely approximated and the chest is closed in layers.

Table 1

Aorta-to-coronary saphenous vein bypass: surgical procedure in 23 patients

	No. of cases	
Single vein bypass:		
Right coronary artery	6	11
Anterior descending artery	3	
Circumflex artery	2	
Double vein bypass:		
Right coronary and anterior descending arteries	9	12
Anterior descending and circumflex arteries	2	
Right coronary and circumflex arteries	1	

Analysis of Surgery

Eleven patients underwent a single vein bypass and the other 12 had a double vein bypass (Table 1). Thirty-four of the anastomoses between the vein and the coronary artery were performed end-to-side, one patient had a side-to-side and end-to-side anastomosis between the saphenous vein and two different segments of the anterior descending coronary artery, and the other had an end-to-end anastomosis to the right coronary artery.

Eleven of the 23 patients had additional surgery (Table 2).

Table 2

Aorta-to-coronary saphenous vein bypass: concomitant surgery in 23 patients

	No. of cases
Resection of left ventricular aneurysm (1 patient with bilateral Vineberg)	3
Plication of akinetic areas of left ventricle	3
Aortic valve replacement	2
Mitral valve replacement	1
Mitral valve annuloplasty	1
Left Vineberg	1
Total	11

Results

Three of the 23 patients died at operation due to uncontrollable ventricular dysrhythmias and low cardiac output, a 13% mortality. Two more died within 30 days of surgery, one due to an arrhythmic episode 6 days after surgery and the other on the twenty-fifth post-operative day due to a massive myocardial infarction; a total mortality of 21·7%. All but one of these problems occurred during our earlier cases before the routine use of cardiopulmonary bypass. With increasing experience in this type of surgery, the mortality has decreased. There has been one death in the last 16 consecutive patients (6·2%).

Among the 18 survivors, 16 had excellent results with complete disappearance of symptoms and marked improvement in exercise tolerance. Two patients had no improvement at all and in both cases the vein bypass to the right coronary was found thrombosed on reinvestigation; these 2 patients were operated on early in this series without cardiopulmonary bypass and both had additionally diseased anterior descending coronary arteries where surgery was not attempted.

Since the routine institution of cardiopulmonary bypass, the surgical technique has been greatly facilitated, making it possible to operate in all the main coronary vessels and most of their major branches (Adam *et al.* 1970, Effler *et al.* 1970, Favaloro 1969, Favaloro, Effler, Groves, Sheldon & Sones 1970, Favaloro, Effler, Groves, Sheldon, Shirey & Sones 1970, Johnson, Flemma & Lepley 1970, Johnson & Lepley 1970). This can be accomplished with an acceptable operative mortality (Edwards *et al.* 1970, Effler 1969*a*, *b*, Green *et al.* 1970, Mitchel *et al.* 1970). It is adaptable for all major coronary arteries, providing an immediate augmentation of coronary blood flow with instant improvement in myocardial perfusion (Johnson, Flemma, Harding, Cooper & Lepley 1970, Johnson, Flemma, Manley & Lepley 1970), and is usually followed by a dramatic relief of symptoms.

The use of vein bypass grafts for the treatment of occlusive coronary artery disease therefore appears promising and merits continued application.

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Surgical Treatment of Severe Hyperidrosis

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Hyperidrosis, or grossly excessive sweating, is a rather unusual and distressing condition which although amenable to effective surgical treatment has received less attention than it deserves.

The sweat glands are of two kinds, eccrine and apocrine (Kuno 1956). The apocrine glands are situated in the axilla, the areola of the nipple, the anogenital zone and the external auditory meatus. Their secretion is a milky turbid fluid which, on bacterial decomposition, gives the typical body odour. Their secretion commences at puberty and there is no evidence that they receive secretory innervation of any kind.

The eccrine sweat glands are found over the entire skin and are particularly concentrated on the palm of the hand and sole of the foot and in the axilla. They secrete a watery fluid whose main component is sodium chloride and whose urea concentration parallels the blood level. The eccrine glands receive sympathetic innervation but are unusual in being cholinergic. Acetylcholine and cholinergic drugs such as pilocarpine produce sweating, whereas cholinergic blocking agents such as atropine and propantheline bromide act as inhibitors.

The eccrine glands are stimulated by heat and this reflex is mediated by changes in the temperature of the perfusing blood in the heat-regulating centre in the hypothalamus; thermoregulatory sweating is especially marked on the upper trunk but occurs over the whole body. Emotional sweating is induced by fear, anxiety, embarrass-